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June 2001

Applied Mathematics 30

Grade 12 Diploma Examination

Alberta
LEARNING

Applied Mathematics 30

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June 2001

Applied Mathematics 30

Grade 12 Diploma Examination

Description

Time: This examination was developed to be completed in 2.5 h; however, you may take an additional 0.5 h to complete the examination.

This is a **closed-book** examination consisting of

- 33 multiple-choice and 6 numerical-response questions, of equal value, worth 65% of the examination
- 3 written-response questions worth 35% of the examination

  This examination contains sets of related questions.

  A set of questions may contain multiple-choice and/or numerical-response and/or written-response questions.

Tear-out data pages are included near the back of this booklet.

Note: *The perforated pages at the back of this booklet may be torn out and used for your rough work.*
No marks *will be given for work done on the tear-out pages.*

Instructions

- You are expected to provide a graphing calculator approved by Alberta Learning.
- You are expected to have cleared your calculator of all information that is stored in the programmable or parametric memory.
- Use only an HB pencil for the machine-scored answer sheet.
- Fill in the information required on the answer sheet and the examination booklet as directed by the presiding examiner.
- Read each question carefully.
- Consider all numbers used in the questions to be **exact** numbers and not the result of a measurement.
- If you wish to change an answer, erase **all** traces of your first answer.
- Do not fold the answer sheet.
- The presiding examiner will collect your answer sheet and examination booklet and send them to Alberta Learning.
- Now turn this page and read the detailed instructions for answering machine-scored and written-response questions.

Multiple Choice

- Decide which of the choices **best** completes the statement or answers the question.

- Locate that question number on the separate answer sheet provided and fill in the circle that corresponds to your choice.

Example

This examination is for the subject of

A. biology
B. physics
C. chemistry
D. mathematics

Answer Sheet

Ⓐ Ⓑ Ⓒ ●

Numerical Response

- Record your answer on the answer sheet provided by writing it in the boxes and then filling in the corresponding circles.

- If an answer is a value between 0 and 1 (e.g., 0.7), then be sure to record the 0 before the decimal place.

- **Enter the first digit of your answer in the left-hand box and leave any unused boxes blank.**

Examples

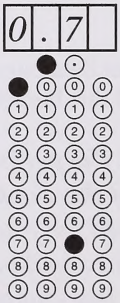
Calculation Questions and Solutions

The value of tan 35°, to the nearest tenth, is __________ .

(Record your answer in the numerical-response section on the answer sheet.)

Calculator value: 0.7002075
Value to be recorded: 0.7

Record 0.7 on the answer sheet ⟶



A particular matrix operation produces the equation

$$2\begin{bmatrix}1 & 0.5\\ 1.5 & 4\end{bmatrix}=\begin{bmatrix}a & b\\ c & 8\end{bmatrix}$$

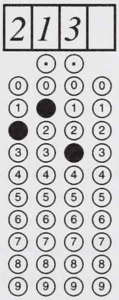
In the equation above, the value of

a is _______ (Record in the **first** column.)
b is _______ (Record in the **second** column.)
c is _______ (Record in the **third** column.)

(Record **all three digits** of your answer in the numerical-response section on the answer sheet.)

Value to be recorded: 213

Record 213 on the answer sheet ——►



Correct-Order Question and Solution

Four different sets of data produce the following standard deviations.

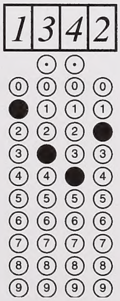
1	0.3	**2**	2.4
3	1.6	**4**	1.9

When these four standard deviations are arranged in order from **lowest** to **highest**, the order is ___, ___, ___, and ___.

(Record **all four digits** of your answer in the numerical-response section on the answer sheet.)

Value to be recorded: 1342

Record 1342 on the answer sheet ——►



Written Response

- Write your answers in the examination booklet as neatly as possible.
- For full marks, your answers must address **all** aspects of the question.
- Descriptions and/or explanations of concepts must be correct and include pertinent ideas, diagrams, calculations, and formulas.
- Your answers must be presented in a well-organized manner using complete sentences and correct units.

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Use the following information to answer the first question.

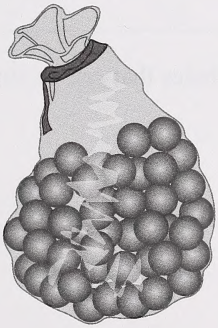
A home-based business produces cans of maple syrup. To produce the maple syrup, it costs the owner $0.02/mL, and he knows that 1 mL is equivalent to 1 cm^3.

1. If the maple syrup is packaged in cylindrical cans that have a radius of 5 cm and a height of 13 cm, then the cost to produce 1 can is

A. $4.08
B. $6.81
C. $11.31
D. $20.42

Use the following information to answer the next question.

Frank wants to produce and market “Infinity Marbles” in packages of 100. Frank expects material costs of 1.2¢ per marble, production costs of 1.5¢ per marble, and packaging costs of 30¢ per package. To make this business worthwhile, Frank requires a 200% profit on sales.

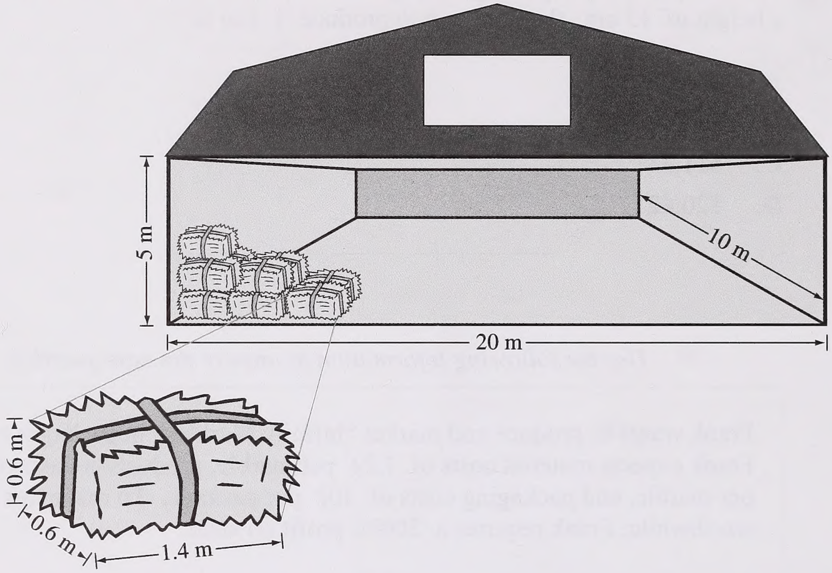


2. To cover his costs **and** make a 200% profit, Frank should sell each package of marbles for

A. $9.00
B. $6.00
C. $3.60
D. $3.00

Use the following information to answer the next question.

The usable space in a farm storage shed has the dimensions $20 \text{ m} \times 10 \text{ m} \times 5 \text{ m}$. The straw bales to be stored in the shed each measure $1.4 \text{ m} \times 0.6 \text{ m} \times 0.6 \text{ m}$. The bales are to be stacked in such a way that the long side of the bale runs parallel to the long side of the shed, as shown in the diagram. Bales must not be broken.



3. The maximum number of bales that can be stored in this shed is

A. 1 120

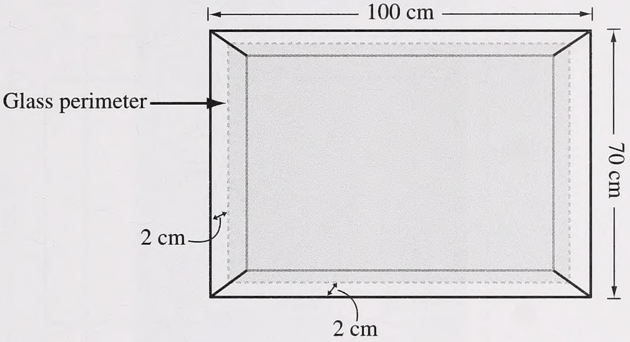
B. 1 792

C. 1 982

D. 1 984

Use the following information to answer the next question.

The glass for a large picture frame must be 2 cm smaller than the outer dimensions of the frame, as shown below. Glass can be purchased for $41.82/m^2.

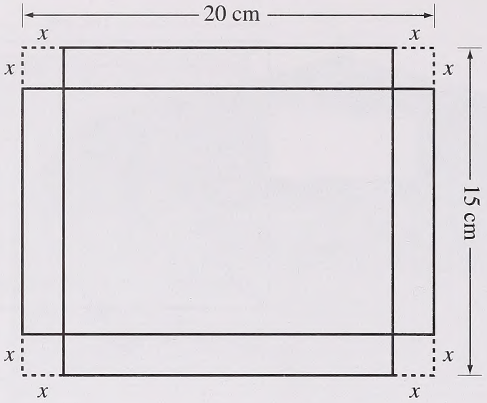


4. The cost of the glass will be

A. $29.27
B. $27.87
C. $27.30
D. $26.50

Use the following information to answer the next question.

A piece of cardboard that measures 20 cm by 15 cm is used to construct a rectangular box. Equal-sized squares are removed from each corner and then the ends are folded up.



5. An equation that could be used to calculate the volume of the box is

A. $v = x(20 - 2x)(15 - 2x)$

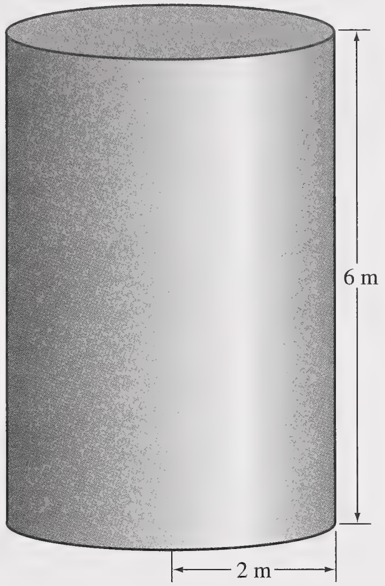
B. $v = x(20 - x)(15 - x)$

C. $v = 2x(20 - 2x)(15 - 2x)$

D. $v = 2x(20 - x)(15 - x)$

Use the following information to answer the next question.

A cylindrical storage tank that measures 6 m tall and has a radius of 2 m is going to be covered with sheet metal.



6. If sheet metal costs $2.08/m^2, then the cost to cover the entire cylinder, including the top and bottom, will be

A. $75.40

B. $156.83

C. $182.97

D. $209.10

Numerical Response

1. The probability of **not** rolling a 4 or a 6 on one roll of a 6-sided fair die with sides numbered 1 through 6, to the nearest hundredth, is __________.

(Record your answer in the numerical-response section on the answer sheet.)

7. A billiard cue manufacturer randomly selects a box of 10 cues and weighs each cue in it. In ounces, the cues weigh 16.9, 16.9, 17.3, 16.8, 17.2, 16.9, 17.5, 16.8, 17.1, and 17.3. The mean and standard deviation of these weights are, respectively,

A. 16.9 oz and 0.2 oz

B. 16.9 oz and 0.7 oz

C. 17.1 oz and 0.2 oz

D. 17.1 oz and 0.7 oz

8. A different billiard manufacturer claims that the cues he produces have a mean mass of 16.9 oz with a standard deviation of 0.3 oz. If he randomly selects a cue, then the probability that its weight is exactly 16.8 oz **or** less is

A. 0.33

B. 0.37

C. 0.40

D. 0.63

Use the following information to answer the next question.

Henry played 24 golf games on the same course during each of two seasons. In the first season, his mean score was 78 with a standard deviation of 2.1. In the second season, his mean score was 74 with a standard deviation of 3.8.

9. The **standard deviation** of Henry’s scores for the two seasons indicates that his

A. scores were more consistent in the first season

B. scores were more consistent in the second season

C. average score was better in the first season

D. average score was better in the second season

Use the following information to answer the next question.

In a particular city with 50 000 high school students, 21 500 were found to be in favour of starting school earlier in the day in order to finish earlier. Josh surveys 100 randomly selected students from this population to determine if they are in favour of this proposal.

10. The symmetric 95% confidence interval for the number of students that Josh finds to be in favour of the proposal is

A. 3 to 83

B. 33 to 53

C. 36 to 50

D. 41 to 45

---

11. In a standard normal distribution, the probability that a particular z-score falls within 0.7 standard deviations of the mean $(-0.7 < z < 0.7)$ is

A. 0.242

B. 0.300

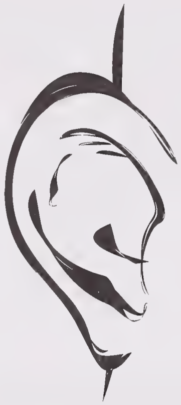
C. 0.516

D. 0.758

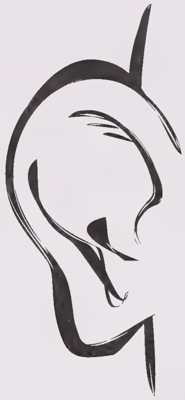
Use the following information to answer the next question.

In humans, earlobe shape is genetically determined by a particular pair of genes. A person may have two dominant genes (*EE*), two recessive genes (*ee*), or a dominant and a recessive gene (*Ee*).

If a person has one or two dominant genes, then he or she will have a detached earlobe.



Attached earlobe



Detached earlobe

Written Response—10%

1. **a.** Complete the chart below to show the sample space for an offspring of parents who each carry one dominant (*E*) gene for the detached earlobe.

		Mother	
		E	*e*
Father	*E*		
	e		

b. What is the probability that an offspring from these parents will have detached earlobes?

Use the following additional information to answer the next part of the question.

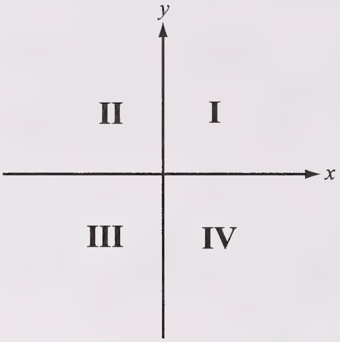
Approximately 39% of **all** people have attached earlobes.

c. Calculate the mean and standard deviation for the number of people in a sample of 8 748 that have attached earlobes. Round your answers to the nearest hundredth.

d. Calculate the symmetric 95% confidence interval for the number of people in this sample that have attached earlobes.

Use the following information to answer the next question.

An object located at the origin of a coordinate grid is acted upon by two forces. One force is 20 N along the positive x-axis, and the other force is 30 N along the negative y-axis. The diagram below shows a coordinate plane with the quadrants labelled.

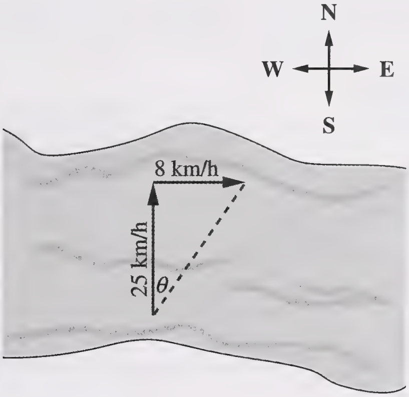


12. The resultant vector of the two forces will be directed into quadrant

A. I
B. II
C. III
D. IV

Use the following information to answer the next question.

A person in a motor boat that has a forward velocity of 25 km/h is trying to travel directly north across a river. A current of 8 km/h affects the course of the boat, as shown below.



Numerical Response

2. Relative to the direct path, the angle of the boat's course, θ, to the nearest tenth of a degree, is __________ °.

(Record your answer in the numerical-response section on the answer sheet.)

Use the following information to answer the next question.

A small aircraft leaves Calgary on a heading of E30°S, travelling 200 km/h. It is affected by a 40 km/h wind blowing toward S60°W.

13. After one hour, the plane's position relative to Calgary will be

A. 183 km E45°S
B. 183 km S30°W
C. 204 km E45°S
D. 204 km S30°W

Use the following information to answer the next question.

A small plane is flying 180 km/h on a bearing of 120°. It is affected by a 45 km/h wind blowing toward a bearing of 300°.

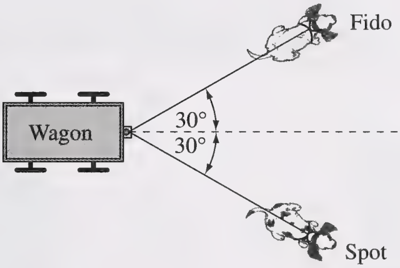
Numerical Response

3. The actual speed of the plane is __________ km/h.

(Record your answer in the numerical-response section on the answer sheet.)

Use the following information to answer the next question.

Two dogs are pulling a wagon. Each dog exerts a force of 150 N. Each dog is pulling in a direction that is 30° away from the direction of travel, as shown below.



14. The resultant force in the direction of travel, to the nearest newton, is

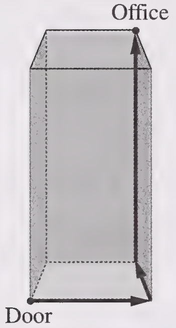
A. 75 N
B. 150 N
C. 260 N
D. 290 N

Use the following information to answer the next question.

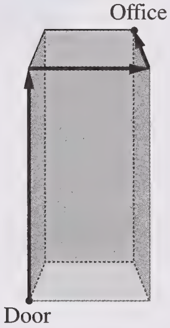
As Norma walks into her office tower, she is facing north. She walks due east from the front door to the elevator. She takes the elevator up 10 floors, then walks due north to her office.

15. Which of the following 3-D diagrams could be used to model Norma's path?

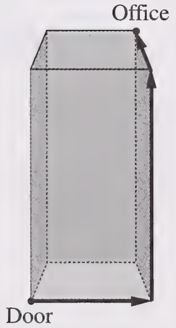
A.



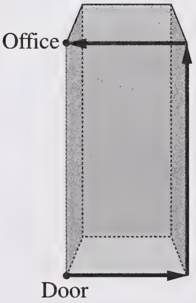
B.



C.



D.



Use the following information to answer the next question.

A particular plane takes 45 min to fly 300 km due north from Calgary to Edmonton when there is no wind.

16. If the plane were to experience a 70 km/h wind blowing directly from the west, what would be the magnitude of the resultant velocity?

A. 470 km/h
B. 406 km/h
C. 400 km/h
D. 394 km/h

Use the following information to answer the next question.

A Set of Data

(0, 15)
(9, 18)
(25, 20)
(42, 19)
(62, 14)
(89, 10)
(104, 12)
(118, 15)

17. This data could most appropriately be modelled by a

A. linear regression
B. quadratic regression
C. sinusoidal regression
D. exponential regression

Use the following information to answer the next question.

The median price for houses in Calgary for each two-year period from 1988 to 1998 is given below.

Number of Years after 1988	**0**	**2**	**4**	**6**	**8**	**10**
Price ($)	127 526	127 621	132 868	134 643	157 353	176 316

These figures may be represented by an equation of the form $y = ax^2 + bx + c$.

Numerical Response

4. The value of a in the equation above, rounded to the nearest whole number, is __________.

(Record your answer in the numerical-response section on the answer sheet.)

Use the following information to answer the next question.

The population in a particular high school was tracked over time.

School Year	**Population**
0	621
1	852
2	____
3	1 250
4	1 324
5	1 348

A student used a quadratic regression equation to represent this data.

18. The student was able to estimate that the population of the school in year 2 was

A. 941

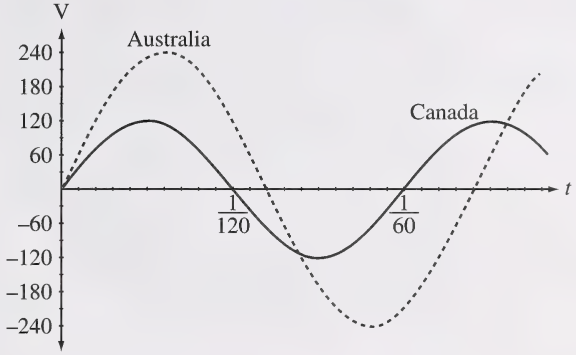
B. 1 051

C. 1 083

D. 1 085

Use the following information to answer the next question.

The sinusoidal function that represents electrical current in Australia and the sinusoidal function that represents electrical current in Canada are graphed below.



19. The sinusoidal function representing electrical current in Australia differs from the sinusoidal function representing electrical current in Canada in

A. amplitude and period

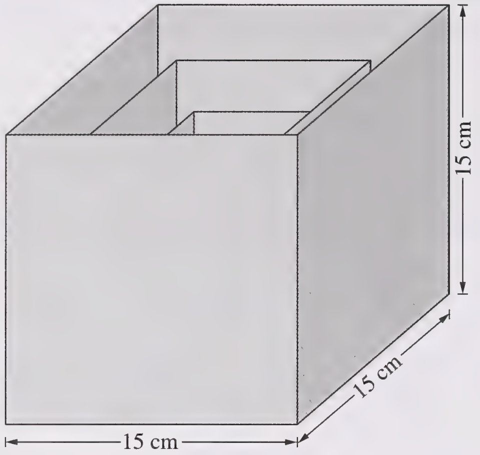
B. period and horizontal shift

C. amplitude and vertical shift

D. horizontal shift and vertical shift

Use the following information to answer the next question.

A set of children's nesting blocks is made of plastic cubes with **one** open side.



Each side of the largest cube is 15 cm. The sides of each subsequent cube are $\frac{2}{3}$ the size of the previous cube's sides.

20. The surface area of the smallest cube in the diagram above, correct to the nearest tenth, is

A. 6.7 cm^2

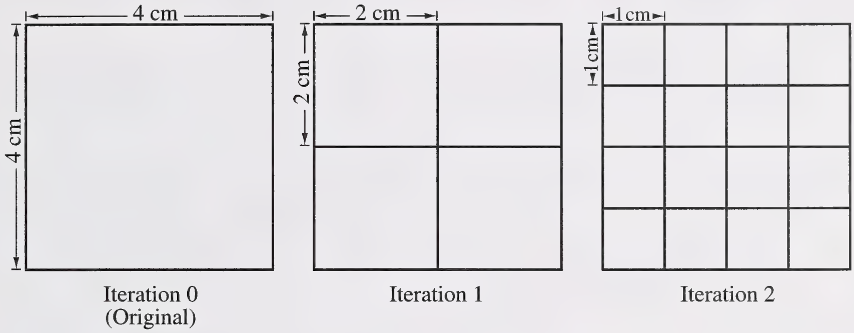
B. 44.4 cm^2

C. 222.2 cm^2

D. 1 500.0 cm^2

Use the following diagram to answer the next two questions.

The following diagrams show the original square and the first two iterations of a fractal pattern. Each side of the square in iteration 0 is bisected to form four new squares in iteration 1. Iteration 2 is formed by bisecting the sides of each small square in iteration 1, which results in 16 new smaller squares.



21. If this pattern continues, the number of smallest-sized squares in iteration 5 will be

A. 1 024

B. 256

C. 64

D. 28

22. The lengths of the sides of each new square formed is halved after each iteration, as shown in the diagram above. The area of each new square formed in iteration 4 is

A. $\frac{1}{2}$ cm^2

B. $\frac{1}{4}$ cm^2

C. $\frac{1}{8}$ cm^2

D. $\frac{1}{16}$ cm^2

23. Jaycen and Kate are the first and second students in a line of 7 students. The number of different orders in which the remainder of the students can line up behind them is

A. 120

B. 240

C. 3125

D. 5040

Use the following information to answer the next two questions.

Deanna wishes to buy flowers for a Valentine's Day promotion at her school. She needs carnations, roses, baby's breath, and greenery. She obtains the following quotes.

	Rose	**Carnation**	**Baby's Breath**	**Greenery**
Rosie's Flowers	\$3.50	\$1.50	\$2.99	\$1.75
The Flower Shop	\$4.25	\$1.25	\$2.49	\$1.99
Flowers Everywhere	\$3.25	\$1.30	\$2.55	\$2.50

She intends to choose only one shop to fill the entire order.

24. Deanna wants to set up a 3×4 matrix to represent the price of flowers, and a second matrix to represent the required quantity of each flower. What dimensions must the second matrix have?

A. 3×1

B. 4×1

C. 3×4

D. 4×3

25. To determine which shop has the lowest cost for the entire order, Deanna should perform a

A. matrix addition

B. matrix subtraction

C. matrix multiplication

D. multiplication by a scalar

Use the following information to answer the next question.

A soccer league collected the following statistics over eight games.

	Win	**Tie**	**Loss**
Bulldogs	4	3	1
Titans	7	1	0
Rovers	2	2	4

Each team earns 2 points for a win, 1 point for a tie, and 0 points for a loss.

26. Which of the following matrix operations could be used to determine the points earned by each team after eight games?

A. $\begin{bmatrix} 4 & 3 & 1 \\ 7 & 1 & 0 \\ 2 & 2 & 4 \end{bmatrix} \times \begin{bmatrix} 2 \\ 1 \\ 0 \end{bmatrix}$

B. $\begin{bmatrix} 2 \\ 1 \\ 0 \end{bmatrix} \times \begin{bmatrix} 4 & 3 & 1 \\ 7 & 1 & 0 \\ 2 & 2 & 4 \end{bmatrix}$

C. $\begin{bmatrix} 4 & 3 & 1 \\ 7 & 1 & 0 \\ 2 & 2 & 4 \end{bmatrix} \times \begin{bmatrix} 2 & 1 & 0 \end{bmatrix}$

D. $\begin{bmatrix} 2 & 1 & 0 \end{bmatrix} \times \begin{bmatrix} 4 & 3 & 1 \\ 7 & 1 & 0 \\ 2 & 2 & 4 \end{bmatrix}$

Use the following information to answer the next question.

Matrix A and Matrix B have a product, Matrix C, as shown below.

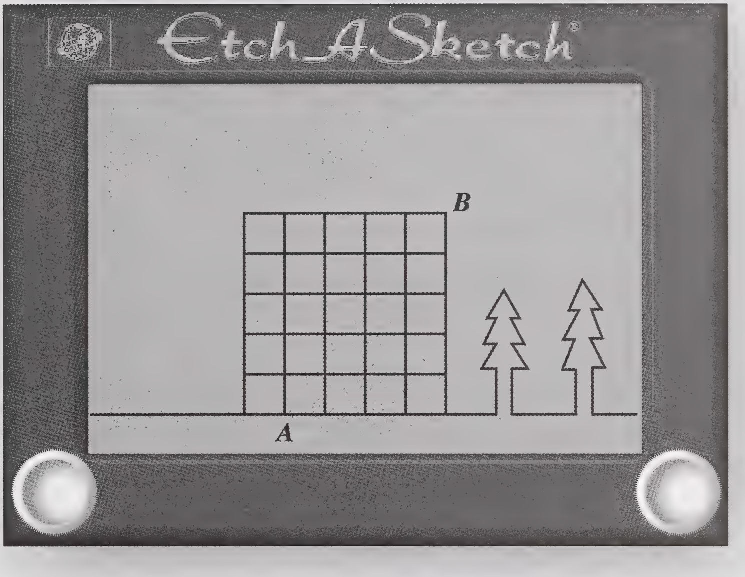
$$\begin{array}{cc} \text{Matrix A} & \text{Matrix B} \\ \begin{bmatrix} 8 & 7 & 4 \\ 3 & 1 & 2 \\ 5 & 6 & 9 \end{bmatrix} \times & \begin{bmatrix} 2 & 1 & 0 & 4 \\ 1 & 2 & 3 & 2 \\ 4 & 2 & 1 & 5 \end{bmatrix} = \text{Matrix C} \end{array}$$

27. The probability that a randomly chosen element in Matrix C is an even number is

A. 0.33
B. 0.38
C. 0.42
D. 0.67

Use the following information to answer the next question.

A student is drawing a diagram on an Etch-A-Sketch™, as shown below. The stylus is at point A, but the student wants to add more detail at point B. To prevent ruining his diagram, he can only move the stylus along previously drawn lines.



Numerical Response

5. If the student moves the stylus only up or to the right from point A to point B, then the number of paths he may follow is __________.

(Record your answer in the numerical-response section on the answer sheet.)

Use the following information to answer the next question.

A manufacturer has two plants: at one, acoustic guitars are made, at the other, electric guitars are made. The following table shows some information related to each plant.

	Acoustic Guitar Plant		**Electric Guitar Plant**	
	Model I	**Model II**	**Model I**	**Model II**
Material per guitar	$ 60	$ 128	$ 35	$ 93
Labour per guitar	$145	$ 275	$210	$290
Selling price per guitar	$500	$1 500	$510	$750
Number made and sold per month	120	75	251	109

Written Response—10%

2. **a.** Determine the total monthly revenue for each plant.

Use the following additional information to answer the next part of the question.

In addition to the cost for materials and labour, the company must cover operating costs.

The operating costs are $40 000/mo for the acoustic guitar plant and $28 000/mo for the electric guitar plant.

b. Determine the monthly profit for each plant.

c. Calculate the monthly profit
- per acoustic guitar
- per electric guitar

d. The company is experiencing financial difficulty and wishes to close one plant. Which plant should be closed? Explain your answer.

Use the following information to answer the next two questions.

John is considering whether to buy or lease a car. The price of the car he is interested in is $25 500. Regardless of the option he chooses, John will make a down payment of $3 000.

John's first option is to purchase the car. He will have to make payments of $557.25/mo for 48 mo.

John's second option is to lease the car. He will have to make payments of $307.50/mo for 48 mo, after which time he will still owe $12 850.

28. *If John wants to own the car at the end of 48 months, he should ___i___ the car because he will save $__ii__.*

The row that completes this statement is row

	i	*ii*
A.	lease	$862
B.	buy	$862
C.	lease	$11 988
D.	buy	$11 988

Use the following additional information to answer the next question.

It is predicted that the value of John's car will depreciate every year for the first four years according to the table below.

Year	Value
0	$25 500
1	$17 850
2	$16 065
3	$14 459
4	$13 012

29. If John uses an exponential regression equation to determine the value of his car in the future, then he will find that the average rate of **depreciation** is

A. 14.4% per year

B. 49.0% per year

C. 51.0% per year

D. 85.6% per year

Use the following information to answer the next question.

Geoff wants to invest some money in fixed-return investments. Matrix Q below shows the interest rate offered for three types of investments at each of three banks.

Matrix Q

Type

$$\begin{array}{r c} & \begin{array}{ccc} \text{A} & \text{B} & \text{C} \end{array} \\ \begin{array}{r} \text{Bank 1} \\ \text{Bank 2} \\ \text{Bank 3} \end{array} & \begin{bmatrix} 7.6\% & 8.0\% & 11.8\% \\ 8.0\% & 7.3\% & 12.0\% \\ 8.3\% & 7.5\% & 12.8\% \end{bmatrix} \end{array}$$

Matrix R shows the amount of money that Geoff is prepared to contribute to each type of investment.

Matrix R

$$\begin{array}{r c} \begin{array}{r} \text{Type A} \\ \text{Type B} \\ \text{Type C} \end{array} & \begin{bmatrix} \$700 \\ \$500 \\ \$400 \end{bmatrix} \end{array}$$

Geoff intends to use only one bank for his investments.

Numerical Response

6. List the banks numbered above from the one that produces the highest overall return on these types of investments to the one that produces the lowest overall return on these types of investments.

Answer: ___________, ___________, ___________

highest overall return **lowest overall return**

(Record **all three digits** of your answer in the numerical-response section on the answer sheet.)

Use the following information to answer the next question.

The following table shows the inventory statement for some of the items available at a convenience store.

	A	B	C	D	E	F	G	H
1	Inventory Statement							
2	**Item**	**Number Purchased**	**Wholesale Price**	**Total Cost**	**Number Sold**	**Retail Price**	**Total Sales**	**Total Profit**
3	Potato Chips	500	$0.45	$225.00	420	$0.85	$357.00	$132.00
4	Chocolate Bars	800	$0.52	$416.00	541	$0.75	$513.95	$97.95
5	2L Pop	600	$1.80	$1 080.00	508	$3.25	$1 651.00	$571.00
6	Gum	1 600	$0.38	$608.00	1 275	$0.80	$1 020.00	$412.00
7	Total	3 500		$2 329.00	2 744		$3 541.95	$1 212.95

30. The formula that could have been used to determine the value in cell H4 is

A. =B4*C4

B. =B4–E4

C. =E4*F4

D. =G4–D4

Use the following information to answer the next question.

Bill takes out an $8 000 loan at 8%/a, compounded monthly, for 1 year. The chart below shows a partial loan payment schedule.

Month	**Balance**	**Interest**	**Payment**	**New Balance**
1	$8 000.00	$53.33	$695.91	$7 357.42
2	$7 357.42	i	$695.91	

31. The value of i is

A. $55.67

B. $53.33

C. $49.05

D. $44.41

Use the following information to answer the next question.

Betty wants to take out a mortgage for $115 000, amortized over 25 years. She is considering two options. One option is to make 12 monthly payments of $770.30 for 25 years. A second option is to make 52 weekly payments of $177.40 for 25 years.

32. The amount that Betty could save over the full amortization of the mortgage by making the weekly payments instead of the monthly payments is

A. $470.00

B. $592.90

C. $60.70

D. $18.80

Use the following information to answer the next question.

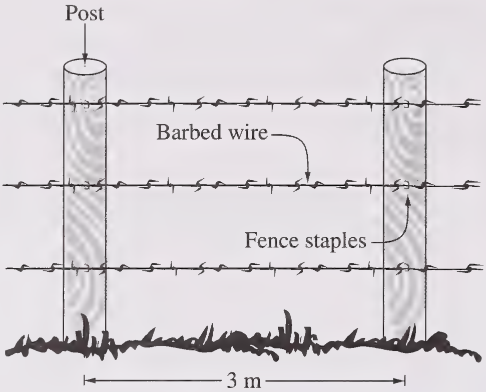
Susan currently has $30 000 in her investment portfolio. She has $3 100 in cash equivalents, $9 600 in fixed-income investments, and $17 300 in equity investments. When Susan received a $5 000 bonus at work, her financial advisor suggested that she should reallocate her total investment portfolio as follows.

Cash Equivalents: 10%
Fixed Income: 40%
Equity Investments: 50%

33. If Susan wishes to follow her financial advisor's advice, then the amount of the $5 000 bonus that she should add to her fixed-income investments so that they comprise 40% of her total investments is

A. $1 400
B. $2 400
C. $3 840
D. $4 400

Use the following information to answer the next question.



The owner of a small plot of land needs to calculate the cost of materials for completely enclosing her property with a barbed-wire fence. The plot of land measures 420 m × 420 m. The posts are pounded into the ground 3 m apart.

The owner creates the table shown below to help her determine the number of posts she will require, given the length of one side of the plot.

Side Length	Total Number of Posts
3 m	4
6 m	8
9 m	12
12 m	16
15 m	
18 m	

Written Response—15%

3. **a.** Complete the chart above.

b. Calculate the total number of posts required to completely enclose the 420 m × 420 m plot of land. Support your answer mathematically.

Use the following additional information to answer the next part of the question.

- The owner will require 3 rows of barbed wire for the fence. The owner needs to purchase an extra 22 m of barbed wire to build gates and braces. Barbed wire is sold in complete rolls of 440 m for $40 per roll.
- Posts will cost $10.20 each. In addition to the number of posts required in part b., the owner needs 11 more posts for braces and gates.
- The paint costs $19.50 per 4L can. Each 4L can of paint will cover 48 m^2. The surface area that will be painted on each post is 0.577 m^2.

c. Calculate the total cost of materials required for this project by completing the table below. Use the space below the table to show your work.

Material Costs			
Item	**Quantity**	**Unit cost**	**Total cost**
Posts		$10.20	
Barbed wire			
Fence staples	1 box	$50.00	$50.00
Paint (4L cans)			
		Subtotal	
		GST (7%)	
		Total cost	

You have now completed the examination.
If you have time, you may wish to check your answers.

Applied Mathematics 30 Formula Sheet

The following information may be useful in writing this examination.

Fold and tear along perforation.

Cost and Design

$A = \pi r^2$

$A = 4\pi r^2$

$A = 2\pi r^2 + 2\pi rh$

$A = \pi r^2 + \pi rs$

$A = \frac{h(b_1 + b_2)}{2}$

$A = \frac{b \cdot h}{2}$

$A = b \cdot h$

$V = \frac{4}{3}\pi r^3$

$V = \pi r^2 h$

$V = B \cdot h$, where B is the area of the base

$V = \frac{1}{3}\pi r^2 h$

$V = \frac{B \cdot h}{3}$, where B is the area of the base

Graphing Calculator Window Format

x: $[x_{\text{min}}, x_{\text{max}}, x_{\text{scl}}]$

y: $[y_{\text{min}}, y_{\text{max}}, y_{\text{scl}}]$

Trigonometry and Vectors

$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

$a^2 = b^2 + c^2 - 2bc \cdot \cos A$

$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

Statistics and Probability

$\mu = np$

$\sigma = \sqrt{np(1 - p)}$

$z = \frac{x - \mu}{\sigma}$

$P(A \text{ or } B) = P(A) + P(B)$

$P(A \text{ and } B) = P(A) \cdot P(B)$

Regression Models

$y = a \cdot \sin(bx + c) + d$

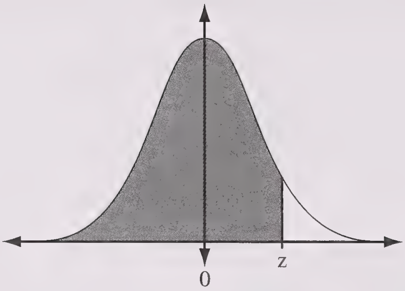
$\text{period} = \frac{2\pi}{b}$

$y = ax^2 + bx + c$

$y = ax + b$

$y = a \cdot b^x$

$$z = \frac{x - \mu}{\sigma}$$



Areas under the Standard Normal Curve

z	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01	0.00
–3.4	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
–3.3	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005	0.0005
–3.2	0.0005	0.0005	0.0005	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007
–3.1	0.0007	0.0007	0.0008	0.0008	0.0008	0.0008	0.0009	0.0009	0.0009	0.0010
–3.0	0.0010	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012	0.0013	0.0013	0.0013
–2.9	0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0018	0.0018	0.0019
–2.8	0.0019	0.0020	0.0021	0.0021	0.0022	0.0023	0.0023	0.0024	0.0025	0.0026
–2.7	0.0026	0.0027	0.0028	0.0029	0.0030	0.0031	0.0032	0.0033	0.0034	0.0035
–2.6	0.0036	0.0037	0.0038	0.0039	0.0040	0.0041	0.0043	0.0044	0.0045	0.0047
–2.5	0.0048	0.0049	0.0051	0.0052	0.0054	0.0055	0.0057	0.0059	0.0060	0.0062
–2.4	0.0064	0.0066	0.0068	0.0069	0.0071	0.0073	0.0075	0.0078	0.0080	0.0082
–2.3	0.0084	0.0087	0.0089	0.0091	0.0094	0.0096	0.0099	0.0102	0.0104	0.0107
–2.2	0.0110	0.0113	0.0116	0.0119	0.0122	0.0125	0.0129	0.0132	0.0136	0.0139
–2.1	0.0143	0.0146	0.0150	0.0154	0.0158	0.0162	0.0166	0.0170	0.0174	0.0179
–2.0	0.0183	0.0188	0.0192	0.0197	0.0202	0.0207	0.0212	0.0217	0.0222	0.0228
–1.9	0.0233	0.0239	0.0244	0.0250	0.0256	0.0262	0.0268	0.0274	0.0281	0.0287
–1.8	0.0294	0.0301	0.0307	0.0314	0.0322	0.0329	0.0336	0.0344	0.0351	0.0359
–1.7	0.0367	0.0375	0.0384	0.0392	0.0401	0.0409	0.0418	0.0427	0.0436	0.0446
–1.6	0.0455	0.0465	0.0475	0.0485	0.0495	0.0505	0.0516	0.0526	0.0537	0.0548
–1.5	0.0559	0.0571	0.0582	0.0594	0.0606	0.0618	0.0630	0.0643	0.0655	0.0668
–1.4	0.0681	0.0694	0.0708	0.0721	0.0735	0.0749	0.0764	0.0778	0.0793	0.0808
–1.3	0.0823	0.0838	0.0853	0.0869	0.0885	0.0901	0.0918	0.0934	0.0951	0.0968
–1.2	0.0985	0.1003	0.1020	0.1038	0.1056	0.1075	0.1093	0.1112	0.1131	0.1151
–1.1	0.1170	0.1190	0.1210	0.1230	0.1251	0.1271	0.1292	0.1314	0.1335	0.1357
–1.0	0.1379	0.1401	0.1423	0.1446	0.1469	0.1492	0.1515	0.1539	0.1562	0.1587
–0.9	0.1611	0.1635	0.1660	0.1685	0.1711	0.1736	0.1762	0.1788	0.1814	0.1841
–0.8	0.1867	0.1894	0.1922	0.1949	0.1977	0.2005	0.2033	0.2061	0.2090	0.2119
–0.7	0.2148	0.2177	0.2206	0.2236	0.2266	0.2296	0.2327	0.2358	0.2389	0.2420
–0.6	0.2451	0.2483	0.2514	0.2546	0.2578	0.2611	0.2643	0.2676	0.2709	0.2743
–0.5	0.2776	0.2810	0.2843	0.2877	0.2912	0.2946	0.2981	0.3015	0.3050	0.3085
–0.4	0.3121	0.3156	0.3192	0.3228	0.3264	0.3300	0.3336	0.3372	0.3409	0.3446
–0.3	0.3483	0.3520	0.3557	0.3594	0.3632	0.3669	0.3707	0.3745	0.3783	0.3821
–0.2	0.3859	0.3897	0.3936	0.3974	0.4013	0.4052	0.4090	0.4129	0.4168	0.4207
–0.1	0.4247	0.4286	0.4325	0.4364	0.4404	0.4443	0.4483	0.4522	0.4562	0.4602
–0.0	0.4641	0.4681	0.4721	0.4761	0.4801	0.4840	0.4880	0.4920	0.4960	0.5000

Fold and tear along perforation.

Areas under the Standard Normal Curve

z	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

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Applied Mathematics 30

June 2001

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